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ences, in the determination of their nature and of their necessary limits will be found a large and fertile field for the investigation of the methodologist.

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## CONTINGENCY IN AN INFINITE WORLD

IN the number of this JOURNAL for February 3, 1910, Mr. W. H. Kilpatrick champions the thesis that "if the actual universe be conceived as quantitatively infinite," definite and final determination "antecedent to the act of eventuation" is excluded. The event on arrival is, indeed, the inevitable outcome of the actual conditions, but in an infinite universe it can never be inevitable—that is, predictable by an adequate intelligence—before it arrives. *A priori* it is necessarily contingent, since the most perfect deduction is necessarily made subject to the proviso that the conditions remain unchanged. This is what can never be guaranteed in an infinite world, a quantitative infinity offering endless possibilities of new factors appearing in the field of even the most perfect calculation.

The question raised is evidently purely speculative. All actual human prediction is, of course, contingent; but Laplace and his followers have been wont to maintain that for a conceivable superhuman intelligence the future, and indeed all time to its smallest details, would be an open book; or, better, a mathematical formula capable of making infallible disclosures without limit in the past and the future. Mr. Kilpatrick denies this speculative possibility on the ground that it requires the postulation of a closed and finite universe, which is "substantially different from what science assumes our actual universe to be."

But in what sense does science assume the universe to be infinite? Mr. Kilpatrick indicates the correct answer when he explains that he uses "the word infinite . . . in the mathematical sense, to indicate, that is, such a variable number as may surpass any arbitrarily assigned number, however great." At this point difficulty appears, for such an infinite is essentially a positive and not a negative term; it is in itself a perfectly definite quantity. However much it may transcend human grasp and be "infinite" relative to human capacity, it is for the superhuman calculator of Laplace a finite quantity; and it does not appear why such an intelligence should not deal with it successfully, and, if not otherwise hindered, compute with entire accuracy and in utmost detail the whole course of events. Nor is any true infinite regress involved in the consideration of the new factors furnishable from the stores of a universe infinite in the mathematical sense. The regress would be limited to the extent of the "infinite" in question, which the imaginary calculator would doubtless find little difficulty in exhausting.

Even were Mr. Kilpatrick to cut loose from the support of physical science, and postulate a universe truly infinite, in the metaphysical sense, it does not seem evident that sure prediction by superhuman intelligence would necessarily be excluded, for the organization of the universe might be of a serial character, consisting of an endless repetition of organized systems each of which had relations indeed with its neighbors, but relations of a purely compensatory nature, so that in the course of a given cycle each received from its environment impulses precisely equivalent to what it gave and no more. In that case even in a universe metaphysically infinite, one fails to see why the determination within each system might not be so complete that perfect prediction on the part of an adequate intelligence should be possible.

Suppose, however, we concede to our author the existence of a truly infinite world with universal articulations, what is the practical bearing of his conclusion? Is it more than the overthrow of an incidental speculation? It does not seem to apply to the matters usually at issue in the determinist controversy. For example, the cosmic contingency for which he pleads offers no word of promise to the principle of individuality as this faces the hostile forces of wholesale mechanism. The human individual is immediately known to us as a seat of efficiency, or immanent activity. Determinism, however, goes behind the returns, and resolves this fundamental content of consciousness—which to mature men is perhaps the thing of supreme worth yielded by experience—into illusion, substituting for the perceptual datum the concept of a moving plexus of cosmic agencies, with our consciousness of self as a mere epiphenomenon, the phantasmally continuing rainbow over the stream of mechanical process.[1] Now, just this and nothing more the human individual seems to remain, so far as any bearing of our author's contingency is concerned. If the outcome in a given life is never absolutely predictable, it is none the less true that, whatever the outcome proves to be, it has been determined completely by cosmic and not at all by purely individual factors; and what does it matter to one that his acts are not altogether predictable so long as they are not his, or his only in an epiphenomenal, illusory sense; and so long as he himself, so far as he exists at all, is really a spectator and not an agent in the world, even as regards the activities he calls his own?

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[1] The only individual which is a reality for determinism (as for Spinoza) is the universe itself; and this, if the determinism is of the naturalistic order, only in half-way fashion, since, while it credits the universe with immanent activity, it finds in it no place at all for ultimate values.

Then, the conscious individual normally regards himself and other minds as centers of ultimate, and not merely instrumental, values. To him values are their own *raison d'être.* Nothing good is called to account by normal consciousness unless it be in view of some greater good. Again, however, determinism exposes the sawdust in the doll. Unless it be theological determinism—in which case its empirical grounds are far to seek—values, too, are linked by it into its endless causal chains, and made mere instruments of cosmic selection, happy hits of nature for ulterior purposes, shrewd devices by which she induces certain parts of herself to maintain useful types of function. Now, from this situation also, one looks in vain for relief to any contingency due merely to the infinitude of the universe.

Indeed, it seems evident that out of absolutely determined materials none but a determinist structure is likely to be built. So long as the mechanical philosopher is allowed to quarry the stone, that is, permitted without protest to reify and virtually apotheosize abstractions from the field of perceptual physics, so long are blocks of thought likely to fit into no edifice not inscribed with the name of Destiny.

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## REVIEWS AND ABSTRACTS OF LITERATURE

*Psychologie de l'Enfant et Pédagogie Expérimentale.* Second edition, revised and enlarged. DR. ED. CLAPARÈDE. Genève: Librarie Kündig. 1909. Pp. viii + 283.

This neat little volume is an attempt to furnish practical teachers with the elementary facts of mental growth together with some suggestions and illustrations of how educational questions may be investigated by the experimental method. The first 190 pages are devoted to an informal discussion of various problems of child-psychology. The author is firmly convinced that psychology, especially that of the child, is of the utmost value for the teacher. An interesting and careful historical survey of the development of child-study in all civilized countries is presented.

Next follows a discussion of problems and methods. The problems of an educational psychology are in brief: preservation of the child in health, development of the mind and body through gymnastics, the equipment of the memory and education as such; that is, the development of character. The chapter on methods simply aims to state in a general way for the teacher the different modes of approach to the subject, such as the method of introspection, observation, experimentation, etc., without attempting to go into technical details.